

SUPPORT FOR THE AMENDMENTS

Claims 1-16 were previously cancelled, and claims 17-35 were previously added, by the Preliminary Amendment submitted on January 14, 2005.

Claims 17-35 have been amended to place these claims in a better condition for allowance.

Support for the amendment to claim 34, which rectifies a typographical error inadvertently introduced, is found at specification page 4, lines 32-34.

It is believed that these amendments have not resulted in the introduction of new matter.

REMARKS

Claims 17-35 are currently pending in the present application. Claims 17-35 have been amended by the present amendment.

Applicants wish to extend their appreciation to Examiner Douglas for the indication on page 6 of the Official Action that claims 30-32 contain allowable subject matter.

The rejections under 35 U.S.C. § 103(a) of: (1) claims 17-26 and 33-35 as being obvious over Meyer (U.S. 2003/0181772); (2) claims 27 and 29 as being obvious over Meyer in view of Dorbon (U.S. Patent 6,137,023); and (3) claim 28 as being obvious over Meyer in view of Paludetto (U.S. Patent 5,563,299), is respectfully traversed.

Applicants respectfully submit that Meyer (U.S. 2003/0181772) is disqualified as prior art under 35 U.S.C. § 103(c) since Meyer and the present application were, at the time the invention was made, commonly owned by, or subject to an obligation of assignment to, the same organization, namely BASF Aktiengesellschaft. This common ownership is further evidenced by the assignment information set forth in the enclosed application data sheets submitted on November 12, 2002, and January 14, 2005, in Meyer and the present application, respectively. See also MPEP § 706.02(1)(3). However, Meyer could have been relied upon as the English language equivalent of WO 01/85656 and DE 10022465. Accordingly, the patentable distinction of the present invention over the disclosure of Meyer is discussed herein.

Claim 17 recites, in part, a continuous process for fractionating a C₄ fraction by extractive distillation using a selective solvent in an extractive distillation column, which is equipped with a dividing wall arranged in a longitudinal direction to thereby form a first region and a second region, wherein the process comprises *taking off from the first region a top stream comprising one or more butanes and taking off from the second region a top stream comprising one or more butenes.*

In contrast, Meyer describes a process for isolating 1,3-butadiene from a C₄ fraction by extractive distillation using a selective solvent in an extractive distillation column (EDK), which is equipped with a dividing wall (T) arranged in a longitudinal direction to thereby form an upper common column region (1), an inflow section (2a, 2b, 4), and an offtake section (3a, 3b, 5a, 5b), wherein the process involves *taking off from the upper common column region (1) a single top stream comprising both butanes and butenes*, and taking off from the offtake section a stream comprising 1,3-butadiene (See e.g., [0006], [0010], [0036], [0064], [0076], [0077], and Fig. 1).

Dorbon describes hydroisomerization of 1-butene to 2-butene (See e.g., column 2, line 29, column 3, lines 34-36, column 4, lines 13-16).

Paludetto describes a process for producing alkyl tert-butyl ethers comprising etherification of a C₄ hydrocarbon mixture consisting essentially of isobutene, linear butenes and butanes, separation of the alkyl tert-butyl ethers produced, and skeletal isomerization of recovered linear butenes to isobutene (See e.g., column 2, lines 38-59, column 3, lines 1-21 and 28-63).

As shown in Figures 1 and 2 of the present specification, the dividing wall (TW) is arranged in the extractive distillation column (EDK) in a manner such that a first region (A) and a second region (B) are formed. According to the claimed process, *a top stream comprising one or more butanes is taken off from the first region (A) and a top stream comprising one or more butenes is taken off from the second region (B)*.

As shown in Figure 1 of Meyer, the dividing wall (T) does not entirely extend to the uppermost end of the extractive distillation column (EDK) and is thus arranged in a manner such that an upper common column region (1) region is formed. Unlike the claimed invention, the process of Meyer involves *taking off from the upper common column region (1) only a single top stream comprising both butanes and butenes* (See e.g., [0006], [0036]).

With such an arrangement of the dividing wall of Meyer, it is impossible to separately take off a top stream comprising one or more butanes and a top stream comprising one or more butenes in a single distillation column, as is achieved in the process of the claimed invention.

Meyer also describes discharging the single top stream comprising both butanes and butenes (See e.g., [0063], [0076]), or sending the single top stream comprising both butanes and butenes to a thermally coupled distillation column (See e.g., [0078], [0079], Figures 2C, 2D, 3B, 3C and 3D).

While Dorbon describes hydroisomerization of 1-butene to 2-butene and Paludetto describes skeletal isomerization of linear butenes to isobutene, Dorbon and Paludetto fail to compensate for the previously mentioned deficiencies of Meyer. Neither Meyer, Dorbon, nor Paludetto, when considered alone or in combination, provide sufficient motivation and guidance to direct a skilled artisan to modify the extractive distillation column of Meyer to entirely extend the dividing wall to the uppermost end of the extractive distillation column to thereby form a first region for taking off a top stream comprising one or more butanes and a second region for taking off a top stream comprising one or more butenes.

Even if sufficient motivation and guidance is considered to have been provided by Meyer, Dorbon, and/or Paludetto, to modify the dividing wall of the extractive distillation column of Meyer to thereby form a first region and a second region for separately taking off a top stream comprising one or more butanes and a top stream comprising one or more butenes, which is not the case, such a case of obviousness is rebutted by a showing of superior advantages and secondary considerations.

Applicants have discovered a process that involves taking off from an extractive distillation column separate streams of one or more butanes and one or more butenes. Accordingly, the simple and low-cost process of the claimed invention has the superior

advantage of taking off separate streams of one or more butanes and one or more butenes with a single extractive distillation column, without the need for employing complicated operations and expensive equipment, such as distillation columns thermally coupled to the extractive distillation column, as required by conventional processes, as described in Meyer.

Meyer describes discharging the single top stream comprising both butanes and butenes presumably as waste, or sending the single top stream comprising both butanes and butenes from the extractive distillation column to a thermally coupled distillation column for separation thereof, which according to the present specification requires about 20% more energy to operate than the claimed process (See e.g., page 16, lines 9-11).

Accordingly, there has been a long-felt need to reduce manufacturing costs during fractionating processes, while minimizing negative impacts on the environment. Based on conventional fractionating processes, which continue to employ complicated operations and expensive equipment while generating waste and consuming excessive amounts of energy, other skilled artisans have failed to discover a solution to this long-felt need. In contrast however, Applicants have discovered a simple, low-cost and environmentally friendly process that involves taking off from an extractive distillation column separate streams of one or more butanes and one or more butenes.

In conclusion, Applicants submit that the present application is now in condition for allowance and notification to this effect is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon



David P. Stitzel
Attorney of Record
Registration No. 44,360

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)

APPLICATION DATA SHEET

APPLICATION INFORMATION

Application Type:: REGULAR
Subject Matter:: UTILITY
CD-ROM or CD-R?: NONE
Title:: CONTINUOUS METHOD FOR
SEPARATING A C<SB>4</SB> CUT
Attorney Docket Number:: 264198US0PCT
Total Drawing Sheets:: 2

INVENTOR INFORMATION

Applicant Authority Type:: INVENTOR
Primary Citizenship Country:: Germany
Status:: FULL CAPACITY
Given Name:: Till
Family Name:: ADRIAN
City of Residence:: Bobenheim-Roxheim
Country of Residence:: Germany
Street of Mailing Address:: Littersheimer Weg 25
City of Mailing Address:: Bobenheim-Roxheim
Country of Mailing Address:: Germany
Postal or Zip Code of Mailing Address:: 67240

Applicant Authority Type:: INVENTOR
Primary Citizenship Country:: Germany
Status:: FULL CAPACITY
Given Name:: Thomas
Family Name:: HILL
City of Residence:: Ludwigshafen
Country of Residence:: Germany
Street of Mailing Address:: Karl-Dillinger-Str. 41
City of Mailing Address:: Ludwigshafen
Country of Mailing Address:: Germany
Postal or Zip Code of Mailing Address:: 67071

Applicant Authority Type:: INVENTOR
Primary Citizenship Country:: Germany
Status:: FULL CAPACITY
Given Name:: Klaus
Family Name:: KINDLER
City of Residence:: Harthausen
Country of Residence:: Germany
Street of Mailing Address:: Richard-Wagner-Str.6a
City of Mailing Address:: Harthausen
Country of Mailing Address:: Germany
Postal or Zip Code of Mailing Address:: 67376

Applicant Authority Type:: INVENTOR
Primary Citizenship Country:: Germany
Status:: FULL CAPACITY
Given Name:: Bernd
Family Name:: HEIDA
City of Residence:: Ellerstadt
Country of Residence:: Germany
Street of Mailing Address:: Speyerer Str.26
City of Mailing Address:: Ellerstadt
Country of Mailing Address:: Germany
Postal or Zip Code of Mailing Address:: 67158

CORRESPONDENCE INFORMATION

Correspondence Customer Number:: 22850

REPRESENTATIVE INFORMATION

Representative Customer Number:: 22850

DOMESTIC PRIORITY INFORMATION

Application::	Continuity Type::	Parent Application::	Parent Filing Date::
This Application	National Stage of	PCT/EP03/07991	07/22/03

FOREIGN PRIORITY INFORMATION

Application Number:	Country::	Filing Date::	Priority Claimed::
102 33 620.2	Germany	07/24/02	YES

ASSIGNMENT INFORMATION

Assignee Name:: BASF Aktiengesellschaft
City of Mailing Address:: Ludwigshafen

Country of Mailing Address:: Germany
Postal or Zip Code of Mailing Address:: 67056

APPLICATION DATA SHEET

APPLICATION INFORMATION

Application Type:: REGULAR
Subject Matter:: UTILITY
CD-ROM or CD-R?:: NONE
Title:: METHOD AND DEVICE FOR TREATING
A C4 FRACTION
Attorney Docket Number:: 230332US0PCT
Total Drawing Sheets:: 7

INVENTOR INFORMATION

Applicant Authority Type:: INVENTOR
Primary Citizenship Country:: Germany
Status:: FULL CAPACITY
Given Name:: Gerald
Family Name:: MEYER
City of Residence:: Ludwigshafen DEX
Country of Residence:: Germany
Street of Mailing Address:: Bockenheimer Strasse 1
City of Mailing Address:: Ludwigshafen
Country of Mailing Address:: Germany
Postal or Zip Code of Mailing Address:: 67067

Applicant Authority Type:: INVENTOR
Primary Citizenship Country:: Germany
Status:: FULL CAPACITY
Given Name:: Gerd
Family Name:: KAIBEL
City of Residence:: Lampertheim DEX
Country of Residence:: Germany
Street of Mailing Address:: Robert-Bosch-Strasse 4
City of Mailing Address:: Lampertheim
Country of Mailing Address:: Germany
Postal or Zip Code of Mailing Address:: 68623

Applicant Authority Type:: INVENTOR
 Primary Citizenship Country:: Germany
 Status:: FULL CAPACITY
 Given Name:: Gerd
 Family Name:: BOHNER
 City of Residence:: Malsch *DEL*
 Country of Residence:: Germany
 Street of Mailing Address:: Im Klipfel 18
 City of Mailing Address:: Malsch
 Country of Mailing Address:: Germany
 Postal or Zip Code of Mailing Address:: 69254

Applicant Authority Type:: INVENTOR
 Primary Citizenship Country:: Germany
 Status:: FULL CAPACITY
 Given Name:: Klaus
 Family Name:: KINDLER
 City of Residence:: Harthausen *DEL*
 Country of Residence:: Germany
 Street of Mailing Address:: Richard-Wagner-Strasse 6a
 City of Mailing Address:: Harthausen
 Country of Mailing Address:: Germany
 Postal or Zip Code of Mailing Address:: 67376

Applicant Authority Type:: INVENTOR
 Primary Citizenship Country:: Germany
 Status:: FULL CAPACITY
 Given Name:: Till
 Family Name:: ADRIAN
 City of Residence:: Bobenheim-Roxheim *DEL*
 Country of Residence:: Germany
 Street of Mailing Address:: Littersheimer Weg 25
 City of Mailing Address:: Bobenheim-Roxheim
 Country of Mailing Address:: Germany
 Postal or Zip Code of Mailing Address:: 67240

Applicant Authority Type:: INVENTOR
 Primary Citizenship Country:: Germany
 Status:: FULL CAPACITY
 Given Name:: Karin
 Family Name:: PICKENAECKER
 City of Residence:: Lampertheim
 Country of Residence:: Germany
 Street of Mailing Address:: Europaring 14
 City of Mailing Address:: Lampertheim
 Country of Mailing Address:: Germany
 Postal or Zip Code of Mailing Address:: 68623

Applicant Authority Type:: INVENTOR
 Primary Citizenship Country:: Germany
 Status:: FULL CAPACITY
 Given Name:: Melanie
 Family Name:: PAHL
 City of Residence:: Mannheim
 Country of Residence:: Germany
 Street of Mailing Address:: Max-Joseph-Strasse 30
 City of Mailing Address:: Mannheim
 Country of Mailing Address:: Germany
 Postal or Zip Code of Mailing Address:: 68167

Applicant Authority Type:: INVENTOR
 Primary Citizenship Country:: Germany
 Status:: FULL CAPACITY
 Given Name:: Thomas
 Family Name:: HILL
 City of Residence:: Mannheim
 Country of Residence:: Germany
 Street of Mailing Address:: H 1, 17
 City of Mailing Address:: Mannheim
 Country of Mailing Address:: Germany
 Postal or Zip Code of Mailing Address:: 68159

CORRESPONDENCE INFORMATION

Correspondence Customer Number:: 22850

REPRESENTATIVE INFORMATION

Representative Customer Number:: 22850

10022465.2 - 1.1.2002

DOMESTIC PRIORITY INFORMATION

Application::	Continuity Type::	Parent Application::	Parent Filing Date::
This Application	National Stage of	PCT/EP01/05279	05/09/01

FOREIGN PRIORITY INFORMATION

Application Number:	Country::	Filing Date::	Priority Claimed::
100 22 465.2	Germany	05/09/00	YES

ASSIGNMENT INFORMATION

Assignee Name::	BASF Aktiengesellschaft
City of Mailing Address::	Ludwigshafen
Country of Mailing Address::	Germany
Postal or Zip Code of Mailing Address::	67056